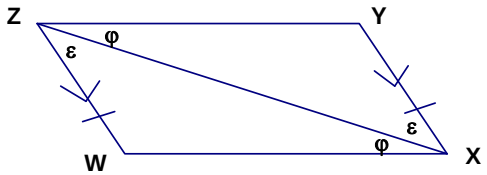
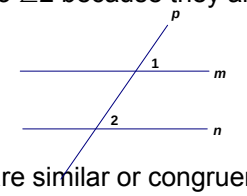
Notes to the Teacher	Appendices
Materials One copy of Blackline Master B9a and B9b for each student or pair of students. Butcher paper – six different colors (3-4 feet in length) Construction paper or card stock – six different colors for each student Ruler Scissors Compass Protractor Tape or glue stick, for each group Colored markers Overhead protractor Note: Prior to this lesson label each of the six different butcher papers with SSS, AAA, SAS, SSA, ASA, AAS. Have these attached to the wall for students to tape or paste their triangles on the appropriate poster. This activity is adapted from Geometry For All Institute, TEXTEAMS, Charles A. Dana Center, 1998. Additional material can be found in *Discovering Geometry*, Key Curriculum Press, pages 219 – 224. For some students the hardest part of completing a proof is to mark the known information and to name the corresponding parts of the two triangles. Insist that the figure be drawn, labeled and marked correctly, with known properties. Formal proofs follow in Lessons 3 - 5. The important goals of Lessons 2 and 3 are to have students accomplish mastery of these skills:	***A9 Fast Food Factory, Part 1*** Part 1 and Part 2 together explore the triangle congruence shortcuts. In Part 1 students draw the SSS, AAA, and SAS triangles to determine which ones create a unique triangle. In Part 2, the SSA, ASA, and AAS relationships are explored. For both lessons, students use a ruler and protractor. Review how to draw angles using a protractor. *Geometry, Explorations and Applications*, McDougal Littell, gives a good explanation on page 35, Example 2. Hints for constructions: For sandwich #1, draw $\overline{AB}$ first. Then use the compass set at 10 inches to locate $\overline{BC}$ and your compass set at 8 inches to locate $\overline{AC}$. Ask students to read the Fast Food Factory problem, Blackline Master B9a, and follow the directions on the student worksheet for #1, #2 and #3. As students complete their constructions on construction paper, have them attach their "special sandwich" to the class sheet of butcher paper on the wall. When all three constructed triangles are displayed, students discuss with their partners which specifications force triangles to be congruent. Bring the class together for a whole class discussion. Possible scaffolding questions: • *What do you notice about the triangles in SSS? If you have two triangles with all three corresponding sides congruent, are the two triangles congruent in every way?* Yes. • *If you know all three angles are congruent in both triangles, are the two triangles always congruent?* No. • *Why?* AAA creates similar triangles, not necessarily congruent triangles, unless, in addition, one pair of corresponding sides is congruent. • *If you have two triangles with two of the corresponding sides and the angle between them congruent, are the triangles congruent?* Yes. Ask students to turn to page 295 in *Geometry, Explorations and Applications*, McDougal Littell and answer the questions in Checking Key Concepts, # 1 - 6. Provide feedback on the questions when all are finished. Ask students to copy the figure in # 7 on their paper, and mark all known information on their papers. Walk around the room to make sure all students are able to mark all of the information. If they are having difficulty, ask what information flows from having parallel lines. The alternate interior angles are congruent.  Draw and mark the figure on the board or overhead transparency. Ask scaffolding questions such as the following: • *In ΔZYX and ΔXWZ, what are the corresponding congruent*

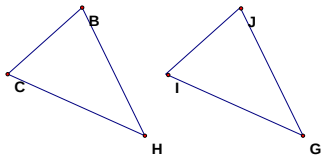
1. Draw figures carefully.
2. Label the figure correctly.
3. Mark the figure with the given congruent information.
4. State if the two triangles are congruent, and if so, by what property.
5. Identify the corresponding parts of congruent triangles.

angles ? $\angle YZX$ corresponds to $\angle WXZ$, $\angle Y$ corresponds to $\angle W$, and $\angle WZX$ corresponds to $\angle YXZ$.

Note: Distinguish between the two different uses of the term "corresponding" in geometry. When parallel lines were studied, corresponding angles were found to be congruent. For example, $\angle 1$ is congruent to $\angle 2$ because they are corresponding angles.



Polygons which are similar or congruent are said to have corresponding angles and sides. If the polygons are similar, the ratio of the corresponding sides is constant. If the polygons are congruent, the corresponding sides and angles are congruent. Ask students to write down the corresponding parts of the two triangles.



$\triangle BCH \cong \triangle JIG$. $\angle B \cong \angle J$, $\angle C \cong \angle I$, $\angle H \cong \angle G$;

$\overline{BC} \cong \overline{JI}$, $\overline{CH} \cong \overline{IG}$, $\overline{BH} \cong \overline{JG}$.

One important skill in today's lesson is to identify the corresponding parts of congruent polygons, especially triangles.

- *Which are the corresponding sides?* $\overline{ZY}$ corresponds to $\overline{XW}$; $\overline{WZ}$ corresponds to $\overline{YX}$.
- Is there enough information to say that the two triangles are congruent? Yes, by SAS, both triangles are congruent.

Make sure that all of the students can identify the two triangles with the corresponding parts. If needed, students can trace one of the triangles on a piece of patty paper and place the triangle on top of the other triangle to show the corresponding parts.

- *Write down the names of the two congruent triangles, being careful to keep the order of corresponding vertices.* ΔXWZ is congruent to ΔZYX.
- Is ΔXYZ congruent to ΔXZW? No, because the corresponding parts are not congruent.
- *Ask students to name all of the corresponding parts of each triangle that are congruent because the two triangles are congruent.* $\angle YZX \cong \angle WXZ$; $\angle Y \cong \angle W$; and $\angle WZX \cong \angle YXZ$; $\overline{ZY} \cong \overline{XW}$; $\overline{WZ} \cong \overline{YX}$; and the given information $\overline{XY} \cong \overline{ZW}$.

Assign:

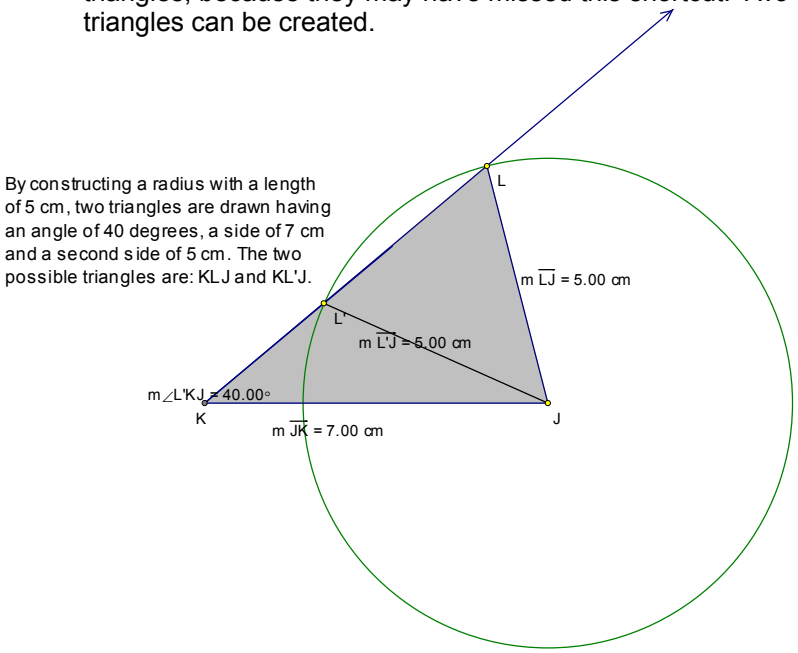
Explorations and Applications, McDougal Littell, pages 295-298, # 1 – 9, 13-14, 20.

OR

Discovering Geometry, Key Curriculum Press, pages222-223, #1 – 17 odds.

OR

Discovering Geometry: Practice Your Skills, Lesson 4.4, page 26, # 4 – 12.

Notes to the Teacher	Appendices
Materials Butcher paper – six different colors (3-4 feet in length) Construction paper or card stock – six different colors for each student Ruler Scissors Compass Protractor Tape or glue stick, for each group Colored markers Overhead protractor Colored transparencies in 2 colors Students reuse Blackline Master B9a and B9b. Note: Attach the remaining three different butcher papers labeled SSA, ASA, AAS, to the wall prior to beginning this activity. Students will tape or paste their triangles on the appropriate poster. Remind students to place their names on the backs of their triangles. Before class, cut out the two triangles, in Problem 15, page 304, each in a different transparency color. This activity is adapted from Geometry For All Institute, TEXTEAMS, Charles A. Dana Center, 1998. Additional material can be found in *Discovering Geometry*, Key Curriculum Press, pages 225 – 229.	***A10 Fast Food Factory, Part 2*** Part 1 and Part 2 together examine the triangle congruence shortcuts. In Part 1 students created the SSA, ASA, and AAS triangles to determine which ones create congruent triangles. In Part 2 students create SSA, ASA and AAS triangles to determine which ones create congruent triangles. For sandwich #4, draw $\angle K$. then draw $\overline{JK}$. Use the compass set at 6 inches to locate $\overline{JL}$. Ask students to re-read the Fast Food Factory problem, Blackline Master B9a, and follow the directions on the student worksheet. As students complete their drawings on construction paper, have them sign the back of the triangle and attach their "special sandwich" to the class sheet of butcher paper on the wall. Once all three constructed triangles are displayed, allow students time to discuss with their partners which specifications force triangles to be congruent. Bring the class together for whole class discussion. Possible scaffolding questions: • *Does knowing two sides and a non-included angle create congruent triangles? No.* Look carefully at the students' triangles, because they may have missed this shortcut. Two triangles can be created.  • *If you know two angles and the side between them, are congruent triangles created?* Yes. • *If you know two angles and a side, are congruent triangles created?* Yes. Students answer # 1-7 on page 302, Checking Key Concepts, *Geometry, Explorations and Applications*, McDougal Littell. The Hypotenuse-Leg Theorem will be added in the Pythagoras unit.

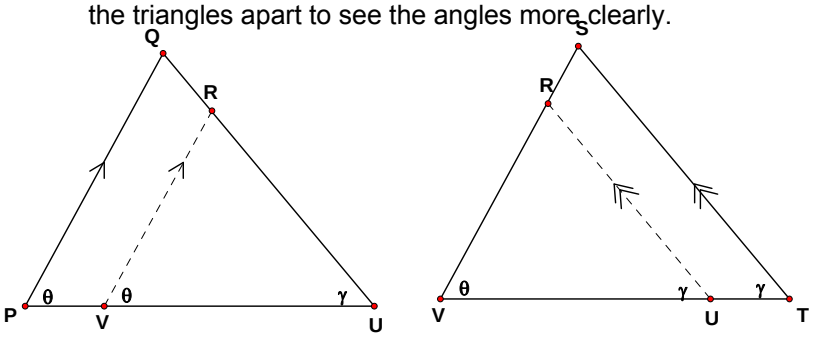
Using #15 on page 304, *Geometry, Explorations and Applications*, McDougal Littell, students draw the figure, label, and mark the given properties. After giving students time to look carefully at the drawing and mark the properties, ask why the information about parallel lines is given in the problem. Possible answers are: identify congruent angles from alternate interior angles, corresponding angles or alternate exterior angles.

Give the students a few moments to identify which angles are congruent due to $\overline{PQ} \parallel \overline{VS}$. Then guide students through a method to help them identify the information implied by the given parallel lines.
Scaffolding:

- *Ask students to mark the parallel lines in one color, and the transversal in a different color.*
- *Ask students which angles are congruent and how they know this information.* $\angle QPU \cong \angle SVT$ because they are corresponding angles.

Give students time to mark the properties implied from $\overline{QU} \parallel \overline{ST}$.

- *Ask students to mark the parallel lines in one color, and the transversal in a different color.*
- *Ask students which angles are congruent and how they know this information.* $\angle S \cong \angle VRU$ because they are corresponding angles. But $\angle VRU$ is not a part of the triangles ΔPQU or ΔVST. If students cannot see this, use the two triangles cut out from different colored transparencies. Move the triangles apart to see the angles more clearly.



- *Ask students to trace the two triangles separately on patty paper, and remind them that this technique is sometimes very helpful in sorting out the information given on complex figures.*
- *Ask students to name the other pair of congruent angles which follow from* $\overline{QU} \parallel \overline{ST}$. $\angle U \cong \angle T$.
- *Ask students if enough information is known about ΔPQU and ΔVST to state that they are congruent triangles.* Yes, by AAS, $\Delta PQU \cong \Delta VST$.
- *Lastly, ask if the corresponding parts of the two congruent triangles are also congruent.* $\angle QUP \cong \angle STV$; $\angle S \cong \angle Q$; $\angle QPU \cong \angle SVT$; $\overline{PQ} \cong \overline{VS}$; (the given information) $\overline{QU} \cong \overline{ST}$; $\overline{UP} \cong \overline{TV}$.

Providing students independent work is an important step in the development of proofs. Flowchart proofs will be introduced in Lesson 3.

Ask students independently to write out this proof in a paragraph form. They may use their notes, and draw the figure, label it, and mark the properties that flow from the given information. Remind them that they

	must always copy the problem and figure exactly as it appears in the book. Then they can separate the triangles, if they choose, marking the triangles appropriately. This assignment can be completed at home. Alternate assignment: *Discovering Geometry,* pages 227-228, #2-16 evens. OR *Discovering Geometry: Practice Your Skills*, Lesson 4.5, page 27, #3-10.

B9a Fast Food Factory

You have applied for a job as a short order cook at the Fast Food Factory in touristy Triangleville. To get the job, you must be able to prepare the foods for which the Fast Food Factory is famous. Their Bill of Fare consists of six specially shaped sandwiches.

Fast Food Factory
Bill of Fare

#1	**SSS**	**Spicy Summer Sausage**
#2	**AAA**	**Awesome Authentic Anchovy**
#3	**SAS**	**Succulent Aromatic Swine**
#4	**SSA**	**Super Sized Antelope**
#5	**ASA**	**Appetizing Sesame Avocado**
#6	**AAS**	**Aunt Annie's Steak**

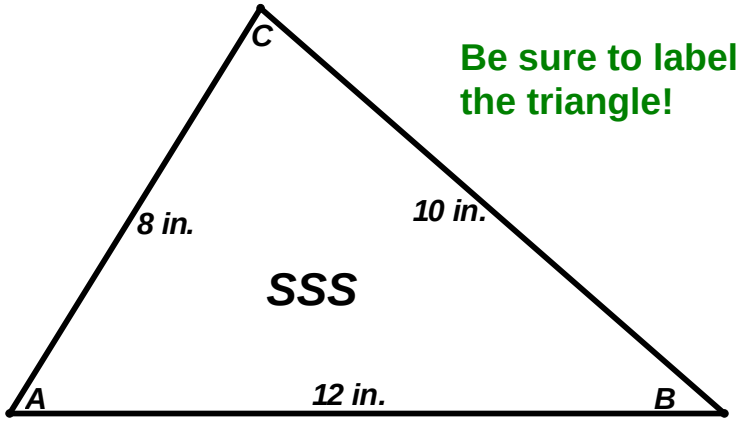
The chef has the final say as to whether or not you meet his strict specifications in preparing each of the six specially shaped (triangular) sandwiches. Make each of sandwiches by reading the specifications, drawing and labeling the triangle on paper, and then cutting it out. Be sure to put your name on each of the triangles because many people have applied for this position as short order cook, and the chef will be judging whose sandwiches best meet the specifications.

Each triangular sandwich you create must contain all of the prescribed (given) information. For any specifications not given, you may decide the length of that side or the size of that angle. Once you have completed each sandwich, make sure you label each vertex with its specified name and each side with its correct length. You will also need to label each triangular sandwich with its menu name. Write all labels in the interior of the triangle.

Create sandwiches #1 (SSS), #2 (AAA), and #3 (SAS) in Part 1. Sandwiches #4 (SSA), #5 (ASA) and #6 (AAS) will be made in Part 2.

Be sure to wash your hands before preparing foods!

B9b Fast Food Factory



Be sure to label inside the triangle!

Here are the six specially shaped (triangular) sandwiches that you must prepare to specifications.

#1 The SSS – Make Δ*ABC* with:
AB = 5 in.
BC = 4 in.
AC = 2 in.

#2 The AAA – Make Δ*DEF* with:
m∠*D* = 60°
m∠*E* = 80°
m∠*F* = 40°

#3 The SAS – Make Δ*GHI* with:
GH = 8 in.
m∠*G* = 55°
GI = 6 in.

#4 The SSA – Make Δ*JKL* with:
JK = 7 in.
JL = 5 in.
m∠*K* = 40°

#5 The ASA – Make Δ*MNO* with:
m∠*M* = 60°
MN = 8 in.
m∠*N* = 45°

#6 The AAS – Make Δ*PQR* with:
m∠*P* = 40°
m∠*R* = 60°
PQ = 8 in.